

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report Nos. 50-20/89-01  
70-938/89-01

Docket Nos. 50-20  
70-938

License Nos. R-37  
SNM-986

Safeguards Group: II

Licensee: Massachusetts Institute of Technology  
138 Albany Street  
Cambridge, Massachusetts 02139

Facility Name: MIT Nuclear Reactor

Inspection At: Cambridge, Massachusetts

Inspection Conducted: March 8-10, 1989

Type of Inspection: Routine Unannounced Material Control, Accounting  
and Physical Security

Inspector: A. Della Ratta 3/31/89  
A. Della Ratta, Safeguards Auditor date

Approved by: R. R. Keimig 4-5-89  
R. R. Keimig, Chief, Safeguards Section, DRSS date

Inspection Summary: Inspection on March 8-10, 1989 (Combined Inspection  
Report Nos. 50-20/89-01 and 70-938/89-01)

Areas Inspected: Nuclear material control and accounting and physical security, including: organization and operation; shipping and receiving; storage and internal controls; inventory; records and reports; and physical protection measures for special nuclear material of moderate strategic significance.

Results: One violation was identified: Failure to inventory all SNM bearing sources every twelve months (paragraph 2.d.).

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## DETAILS

### 1. Key Persons Contacted

- \*J. Bernard, Jr., Director of Operations
- \*G. Hopkins, Assistant Director of Operations
- \*K. Kwok, Superintendent of Operations
- \*M. Galanek, Associate Radiation Protection Officer
- \*H. Bondar, Administrative Assistant
- \*P. Coggio, Reactor Radiation Protection Officer
- J. Mahoney, Deputy Chief, MIT Campus Police
- J. Cappucci, Lieutenant, MIT Campus Police
- G. Elderd, Sergeant, MIT Campus Police
- R. Solakoff, Sergeant, MIT Campus Police

The inspector interviewed other licensee employees associated with nuclear material control and physical security.

\*present at exit interview

### 2. Material Control and Accounting

#### a. Organization and Operation

The inspector verified through a review of records that the licensee maintained procedures for nuclear material control and accounting and that written statements of responsibilities and authority existed for those positions with responsibility for special nuclear material (SNM). The licensee was in the process of completing the revision of its Manual of Procedures and Instructions related to accountability for source, special nuclear and certain other materials, to reflect current practices. The revisions will be completed, approved and in effect by April 21, 1989.

#### b. Shipping and Receiving

The inspector determined through a review of records that the licensee maintained procedures to assure that all nuclear material shipped or received was accurately accounted for.

A review was performed of all DOE/NRC Form-741's generated during the period April 1, 1987 through September 30, 1988 to assure that each was properly signed, dispatched in a timely manner, and that the data were accurate. No discrepancies were identified.

#### c. Storage and Internal Control

The inspector determined through observations and review of records that, with the exception noted in paragraph 2.d., the licensee was

maintaining a system of storage and internal control which provided knowledge of the quantity, identity, and current location of all SNM within the facility.

SNM storage areas were maintained, and, included the reactor core, fuel pool, new fuel storage vault and other areas that were appropriate for SNM contained in other than fuel.

d. Inventory

The inspector performed an inventory verification on March 8 and 9, 1989, which consisted of a piece count of all the irradiated fuel elements, and irradiated sectioned elements. The inspector also verified other selected SNM items on the facility physical inventory.

During the inventory verification the inspector found three SNM bearing sources which were not listed on the licensee's master inventory list. These sources were subsequently found listed in an item control card file that was located in Building 6-Room 017. The sources were apparently overlooked during transfer of the item control card files to the licensee's master inventory list. This resulted in the three SNM bearing sources not being accounted for during inventories every twelve months between November 1985 and March 1989 as required by 10 CFR 70.51(d). The last physical inventory of these sources was conducted by the licensee during October 1985. Failure to comply with 10 CFR 70.51(d) is a violation of NRC requirements (70-938/89-01-01).

The licensee agreed to reinventory the SNM located in Building 6 - Room 017, where the three sources were found by the inspector and will provide Region I with the inventory results by March 31, 1989.

e. Records and Reports

The inspector reviewed the licensee's records, reports, and source data. All Material Balance Reports (DOE/NRC Form - 742) and all Nuclear Material Transaction Reports (DOE/NRC Form - 741), submitted by the licensee for the period April 1, 1987 to September 30, 1988 were reviewed. Total uranium and uranium depletion records were also reviewed. No discrepancies were noted.

Exhibits I, II, III and IV of this report summarize the licensee's nuclear material activities for the period April 1, 1987 - September 30, 1988.

3. General Physical Protection of Special Nuclear Material of Moderate Strategic Significance

The licensee's program for the physical protection of SNM of moderate strategic significance was reviewed by the inspector and was found to conform to NRC requirements and the licensee's implementing procedures.



Specific components of the program that were inspected included: records and reports; security organization; alarm response; key control; detection aids; physical barriers; and written security procedures.

The licensee is presently in the process of revising Section 3.6.3 of its physical security plan, which covers the search policy. Regulatory Guide 5.59, Revision I, dated February 1983, is being used as guidance in preparing this revision.

4. Exit Interview

The inspector met with the licensee representatives indicated in paragraph 1 on March 10, 1989 and summarized the scope and findings of the inspection.

At no time during this inspection was written material provided to the licensee by the inspector.

EXHIBIT I

Massachusetts Institute of Technology

Docket Nos. 50-20 and 70-938  
License Nos. R-37 and SNM-986

Material Balance for Period: April 1, 1987 - September 30, 1988

Reporting Identification Symbol: CCP      Reporting Units: Grams

|   | <u>Enriched Uranium</u> |                |
|---|-------------------------|----------------|
|   | <u>Element</u>          | <u>Isotope</u> |
| Beginning Inventory:<br>(April 1, 1987)   | 1,994,194               | 51,606         |
| Receipts:                                 | <u>1,636</u>            | <u>1,525</u>   |
| Material To Account For:                  | <u>1,995,830</u>        | <u>53,131</u>  |
| Removals:                                 |                         |                |
| Book Transfer To RIS:XSP                  | 1,995,098               | 52,268         |
| Shipments:                                | -0-                     | -0-            |
| Fission and Transmutation:                | 734                     | 864            |
| Inventory Difference: (Rounding)          | (2)                     | (1)            |
| Ending Inventory:<br>(September 30, 1988) | <u>-0-</u>              | <u>-0-</u>     |
| Material Accounted For:                   | <u>1,995,830</u>        | <u>53,131</u>  |

EXHIBIT II

Massachusetts Institute of Technology

Docket No. 70-938  
License No. SNM-986

Material Balance for Period: April 1, 1987 - September 30, 1988

Reporting Identification Symbol: CCP      Reporting Units: Grams

Plutonium

|   | <u>PU</u>  | <u>PU 239 &amp; 241</u> |
|---|------------|-------------------------|
| Beginning Inventory:<br>(April 1, 1987)   | 170        | 159                     |
| Receipts:                                 | <u>-0-</u> | <u>-0-</u>              |
| Material To Account For:                  | 170<br>=== | 159<br>===              |
| Removals: Book Transfer To RIS:XSP        | 170        | 159                     |
| Ending Inventory:<br>(September 30, 1988) | <u>-0-</u> | <u>-0-</u>              |
| Material Accounted For:                   | 170<br>=== | 159<br>===              |



EXHIBIT III

Massachusetts Institute of Technology

Docket Nos. 50-20 and 70-938  
License Nos. R-37 and SNM-986

Material Balance for Period: April 1, 1987 - September 30, 1988

Reporting Identification Symbol: XSP      Reporting Units: Grams

|   | <u>Enriched Uranium</u>   |                        |
|---|---------------------------|------------------------|
|   | <u>Element</u>            | <u>Isotope</u>         |
| Beginning Inventory:<br>(April 1, 1987)   | 11                        | 10                     |
| Receipts: (Book Transfer from RIS:CCP)    | <u>1,995,098</u>          | <u>52,268</u>          |
| Material To Account For:                  | <u>1,995,109</u><br>===== | <u>52,278</u><br>===== |
| Removals:                                 |                           |                        |
| Shipments:                                | -0-                       | -0-                    |
| Fission and Transmutation:                | 160                       | 188                    |
| Inventory Difference: (Rounding)          | 1                         | -0-                    |
| Ending Inventory:<br>(September 30, 1988) | <u>1,994,948</u>          | <u>52,090</u>          |
| Material Accounted For:                   | <u>1,995,109</u><br>===== | <u>52,278</u><br>===== |

EXHIBIT IV

Massachusetts Institute of Technology

Docket No. 70-938

License No. SNM-986

Material Balance for Period: April 1, 1987 - September 30, 1988

Reporting Identification Symbol: XSP

Reporting Units: Grams

Plutonium

|   | <u>PU</u>  | <u>PU 239 &amp; 241</u> |
|---|------------|-------------------------|
| Beginning Inventory:<br>(April 1, 1987)   | 196        | 183                     |
| Receipts: (Book Transfer from RIS:CCP)    | <u>170</u> | <u>159</u>              |
| Material To Account For:                  | 366<br>=== | 342<br>===              |
| Removals:                                 | -0-        | -0-                     |
| Ending Inventory:<br>(September 30, 1988) | <u>366</u> | <u>342</u>              |
| Material Accounted For:                   | 366<br>=== | 342<br>===              |